

Health Advisory: Ricin

Health Advisory
February 3, 2004

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SUBJECT: Ricin

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This document will be updated as new information becomes available. The current version can always be viewed at <http://www.dhss.state.mo.us/>.

The Missouri Department of Health & Senior Services (DHSS) is now using 4 types of documents to provide important information to medical and public health professionals, and to other interested persons:

Health Alerts convey information of the highest level of importance which warrants immediate action or attention from Missouri health providers, emergency responders, public health agencies, and/or the public.

Health Advisories provide important information for a specific incident or situation, including that impacting neighboring states; may not require immediate action.

Health Guidances contain comprehensive information pertaining to a particular disease or condition, and include recommendations, guidelines, etc. endorsed by DHSS.

Health Updates provide new or updated information on an incident or situation; can also provide information to update a previously sent Health Alert, Health Advisory, or Health Guidance; unlikely to require immediate action.

On February 2, 2004, a white, powdery substance discovered in the Dirksen Senate Office Building in Washington, DC, was reportedly found to contain ricin. Ricin is a potent biological toxin that is derived from castor beans. Its mechanism of action in the body is inhibition of protein synthesis. Clinical manifestations are dependent on the route of exposure. Inhalation of ricin typically leads to respiratory distress, fever, and cough followed by the development of pulmonary edema, hypotension, respiratory failure, and possibly death within 36 to 72 hours. Ingestion of ricin typically leads to profuse vomiting and diarrhea followed by multisystem organ failure and possibly death within 36 to 72 hours of exposure.

This **Health Advisory** provides basic information on ricin poisoning, as well as information on resources available through the Missouri State Public Health Laboratory for environmental testing for ricin.

Situations involving a letter or package that has been found to contain a suspicious powder should be handled as described in the March 28, 2003, Health Alert #44 “How To Handle Anthrax Threats, Including Letters and Packages Containing Unknown Powdery Substances” (available at http://www.dhss.state.mo.us/BT_Response/HA44.pdf) Law enforcement officials should be contacted immediately, and they will determine whether there is a credible threat. If such a determination is made, they will contact the Missouri Department of Health & Senior Services (DHSS) and a decision will be made on whether testing of the substance should be conducted. If such testing is indicated, the substance will be delivered to MSPHL by the FBI or other designated law enforcement officials and appropriate tests (e.g., anthrax, ricin) will be performed.

Persons who believe they might have been exposed to ricin should follow the recommendations in the section beginning on page 3, below, entitled “How you can protect yourself, and what to do if you are exposed to ricin.”

Questions on ricin poisoning should be directed to DHSS at 800/392-0272. Additional information about ricin, including information for medical professionals on ricin poisoning diagnosis and management, is available on the Missouri Department of Health & Senior Services (DHSS) Bioterrorism Website at http://www.dhss.state.mo.us/BT_Response/Med/m_ricin.htm.

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Facts About Ricin

What ricin is

- Ricin is a naturally occurring toxin found in the castor bean.
- It can be in the form of a powder, a mist, or a pellet, or it can be dissolved in water or weak acid.
- It is a stable substance. For example, it is not affected much by extreme conditions such as very hot or very cold temperatures.

Where ricin is found and how it is used

- Castor beans are processed throughout the world to make castor oil. Ricin is part of the waste "mash" produced when castor oil is made.
- Ricin has some potential medical uses, such as bone marrow transplants and cancer treatment (to kill cancer cells).

How you could be exposed to ricin

- It would take a deliberate act to make ricin and use it to poison people. Accidental exposure to ricin is highly unlikely.
- People can breathe in ricin mist or powder and be poisoned.
- Ricin can also be placed into water or food and then be swallowed.
- Pellets of ricin, or ricin dissolved in a liquid, can be injected into people's bodies.
- Depending on the route of exposure (such as injection), as little as 500 micrograms of ricin could be enough to kill an adult. A 500-microgram dose of ricin would be about the size of the head of a pin. A greater amount would be needed to kill people if the ricin were inhaled (breathed in) or swallowed.
- Ricin poisoning is not contagious. It cannot be spread from person to person through casual contact.

How ricin works

- Ricin works by getting inside the cells of a person's body and preventing the cells from making the proteins they need. Without the proteins, cells die. Eventually this is harmful to the whole body, and death may occur.
- Effects of ricin poisoning depend on whether ricin was inhaled, ingested, or injected.

Signs and symptoms of ricin exposure

- The major symptoms of ricin poisoning depend on the route of exposure and the dose received, though many organs may be affected in severe cases.
- Initial symptoms of ricin poisoning by inhalation may occur within 8 hours of exposure. Following ingestion of ricin, initial symptoms typically occur in less than 6 hours.
- **Inhalation:** Within a few hours of inhaling significant (3 mcg/kg) amounts of ricin, the likely symptoms would be respiratory distress (difficulty breathing), fever, cough, nausea, and tightness in the chest. Heavy sweating may follow as well as fluid building up in the lungs (pulmonary edema). This would make breathing even more difficult, and the skin might turn blue. Excess fluid in the lungs would be diagnosed by x-ray or by listening to the chest with a stethoscope. Finally, low blood pressure and respiratory failure may occur, leading to death. In cases of known exposure to ricin, people having respiratory symptoms that started within 12 hours of inhaling ricin should seek medical care.

- **Ingestion:** If someone swallows a significant (30 mcg/kg) amount of ricin, he or she would develop vomiting and diarrhea that may become bloody. Severe dehydration may be the result, followed by low blood pressure. Other signs or symptoms may include hallucinations, seizures, and blood in the urine. Within several days, the person's liver, spleen, and kidneys might stop working, and the person could die.
- Skin and eye exposure: Ricin in the powder or mist form can cause redness and pain of the skin and the eyes.
- Death from ricin poisoning could take place within 36 to 72 hours of exposure, depending on the route of exposure (inhalation, ingestion, or injection) and the dose received. If death has not occurred in 3 to 5 days, the victim usually recovers.
- Showing these signs and symptoms does not necessarily mean that a person has been exposed to ricin.

How ricin poisoning is treated

Because no antidote exists for ricin, the most important factor is avoiding ricin exposure in the first place. If exposure cannot be avoided, the most important factor is then getting the ricin off or out of the body as quickly as possible. Ricin poisoning is treated by giving victims supportive medical care to minimize the effects of the poisoning. The types of supportive medical care would depend on several factors, such as the route by which victims were poisoned (that is, whether poisoning was by inhalation, ingestion, or skin or eye exposure). Care could include such measures as helping victims breathe, giving them intravenous fluids (fluids given through a needle inserted into a vein), giving them medications to treat conditions such as seizure and low blood pressure, flushing their stomachs with activated charcoal (if the ricin has been very recently ingested), or washing out their eyes with water if their eyes are irritated.

How you can know whether you have been exposed to ricin

- If we suspect that people have inhaled ricin, a potential clue would be that a large number of people who had been close to each other suddenly developed fever, cough, and excess fluid in their lungs. These symptoms could be followed by severe breathing problems and possibly death.
- No widely available, reliable test exists to confirm that a person has been exposed to ricin.

How you can protect yourself, and what to do if you are exposed to ricin

- First, get fresh air by leaving the area where the ricin was released. Moving to an area with fresh air is a good way to reduce the possibility of death from exposure to ricin.
 - If the ricin release was outside, move away from the area where the ricin was released.
 - If the ricin release was indoors, get out of the building.
- If you are near a release of ricin, emergency coordinators may tell you to either evacuate the area or to "shelter in place" inside a building to avoid being exposed to the chemical. For more information on evacuation during a chemical emergency, see "Facts About Evacuation" (<http://www.bt.cdc.gov/planning/evacuationfacts.asp>). For more information on sheltering in place during a chemical emergency, see "Facts About Sheltering in Place" (<http://www.bt.cdc.gov/planning/shelteringfacts.asp>).
- If you think you may have been exposed to ricin, you should remove your clothing, rapidly wash your entire body with soap and water, and get medical care as quickly as possible.
- *Removing your clothing:*

- Quickly take off clothing that may have ricin on it. Any clothing that has to be pulled over the head should be cut off the body instead of pulled over the head.
- If you are helping other people remove their clothing, try to avoid touching any contaminated areas, and remove the clothing as quickly as possible.
- *Washing yourself:*
 - As quickly as possible, wash any ricin from your skin with large amounts of soap and water. Washing with soap and water will help protect people from any chemicals on their bodies.
 - If your eyes are burning or your vision is blurred, rinse your eyes with plain water for 10 to 15 minutes. If you wear contacts, remove them and put them with the contaminated clothing. Do not put the contacts back in your eyes (even if they are not disposable contacts). If you wear eyeglasses, wash them with soap and water. You can put your eyeglasses back on after you wash them.
- *Disposing of your clothes:*
 - After you have washed yourself, place your clothing inside a plastic bag. Avoid touching contaminated areas of the clothing. If you can't avoid touching contaminated areas, or you aren't sure where the contaminated areas are, wear rubber gloves, turn the bag inside out and use it to pick up the clothing, or put the clothing in the bag using tongs, tool handles, sticks, or similar objects. Anything that touches the contaminated clothing should also be placed in the bag. If you wear contacts, put them in the plastic bag, too.
 - Seal the bag, and then seal that bag inside another plastic bag. Disposing of your clothing in this way will help protect you and other people from any chemicals that might be on your clothes.
 - When the local or state health department or emergency personnel arrive, tell them what you did with your clothes. The health department or emergency personnel will arrange for further disposal. Do not handle the plastic bags yourself.
- For more information about cleaning your body and disposing of your clothes after a chemical release, see "Chemical Agents: Facts About Personal Cleaning and Disposal of Contaminated Clothing" (<http://www.bt.cdc.gov/planning/personalcleaningfacts.asp>).
- If someone has ingested ricin, do not induce vomiting or give fluids to drink.
- Seek medical attention right away. Dial 911 and explain what has happened.

Adapted (with slight modifications) from: CDC. *Facts About Ricin*. February 3, 2004.
<http://www.bt.cdc.gov/agent/ricin/facts.asp>

The Missouri State Public Health Laboratory (MSPHL) can conduct testing of environmental specimens for evidence of ricin toxin using a rapid antigen detection by time-resolved fluorescence (TRF) test. Specimens best suited for testing include: paper, powders, soil or mud, water, food, drink, environmental swabs (Dacron, rayon or foam, not cotton) and environmental wipes (non-cotton gauze, polyester blend materials). Presumptive results should be available in 4 hours, although results for individual samples could take longer. Samples will be referred to the Centers for Disease Control & Prevention (CDC) for confirmation. It is important to note that these samples may be toxic. Extreme caution should be taken in collecting, preparing for shipment, and transporting any material suspected of being contaminated with this agent. Consultation with MSPHL staff is recommended; they may be reached at **573/751-3334** or **751-0633**, or at **800/392-0272** (24 hours a day – 7 days a week). As indicated above, any situation involving a suspicious powder must first be reported to law enforcement officials, who will determine if a credible threat is present. If such a determination is made, then these officials will confer with DHSS staff regarding whether testing of environmental specimens should take place.